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AUTHOR	Jensen, Jacquelyn W.; Kauchak, Don; Rowley, Maxine Lewis
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ABSTRACT

In a best-evidence synthesis of studies that examine change in teacher candidates' conceptions and practices during their teacher education course work, too few researchers provide evidence for the linkage between candidates' beliefs and their learning. To address this problem, a mixed-design study explored on the micro-level (i.e., a lesson) the connections between differential learning among four teacher candidates and their beliefs. Specifically, concept maps, a postmapping questionnaire, stimulated recall interviews, and a short answer assessment revealed connections between candidates' beliefs and their learning. Analysis of these data provided evidence that candidates' beliefs were good predictors of those candidates who learned the most and the least. Implications for future research concerning the beliefs that teacher candidates bring to teacher education, and how various instructional approaches influence these beliefs, are discussed. (Contains 18 references.) (Author/SM)

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TEACHER CANDIDATES' BELIEFS: IMPLICATIONS FOR PRACTICE

by

Jacquelyn W. Jensen, Assistant Professor
School of Family Life
3256B SFLC
Brigham Young University
Provo, UT 84602
Phone: (801) 378-1282
Fax: (801) 378-3303
E-mail: jackie_jensen@byu.edu

Don Kauchak, Professor
Department of Teaching and Learning
University of Utah

Maxine Lewis Rowley, Associate Professor
School of Family Life
Brigham Young University

Paper presented at the annual meeting of the
American Association of Colleges for Teacher Education,
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Abstract

In a best-evidence synthesis of studies that examine change in candidates' conceptions and practices during their teacher education course work, too few researchers provide evidence for the linkage between candidates' beliefs and their learning. To address this problem, a mixed design study explored on the micro-level (i.e., a lesson) the connections between differential learning among four candidates and their beliefs. Specifically, concept maps, a postmapping questionnaire, stimulated recall interviews, and a short answer assessment revealed connections between candidates' beliefs and their learning. Analysis of these data provided evidence that candidates' beliefs were good predictors of those candidates who learned the most and the least. Implications for future research concerning the beliefs that candidates bring to teacher education, and how various instructional approaches influence these beliefs are discussed.

Teacher Candidates' Beliefs:

Implications for Practice

Introduction

Many teacher educators operate according to the assumption that preservice teachers' actions within the classroom are associated with their knowledge of teaching and learning (Artiles, Mostert, & Tankersley, 1994). According to life history and socialization researchers (e.g., Bullough, 1997; Lortie, 1975; Zeichner & Gore, 1990), candidates' beliefs, formed through personal experience and experience over many years with schooling and instruction, inhibit their developing rich, elaborate understandings of the knowledge base for teaching (Reynolds, 1989). In a best-evidence synthesis of studies that examine change in candidates' conceptions and practices (Jensen & Winitzky, 1999), six of the nine studies that reported limited or no change attributed the problem to candidates' beliefs (e.g., Foss & Kleinsasser, 1996; Goodman, 1988; Holt-Reynolds, 1992). Of the 32 studies that reported change in candidates' conceptions and practices, none of them attributed change to candidates' beliefs. A glaring problem across the studies reviewed seems to be that too few researchers provide evidence for the linkages between candidates' beliefs and their learning. The present study employed a mixed design to explore on the micro-level (i.e., a lesson) the connections between differential learning among four candidates and their beliefs.

Four research questions were investigated in this study. These questions included: (1) What were the instructor's goals?, (2) What instructional strategies were present in the instructional episode?, (3) What were candidates' beliefs about teaching and learning?, and (4) What relationships, if any, existed between candidates' beliefs and their learning?

Method

Sixteen female teacher candidates participated in the study. Reported here are case studies of four candidates whose beliefs ranged along a continuum from traditional, teacher-centered views of teaching and learning to views associated with various constructivist learning theories. Candidates were

enrolled in an integrated sequence of three methods and curriculum courses. They took these courses the semester before completing their student teaching in secondary schools. Participants attended a large, private university operated by a religious organization in the Rocky Mountains. A demographic questionnaire revealed that one of the four candidates was married; all candidates were White; all four candidates were fluent in a language other than English. Their mean age was 25.

Dr. Adams, the instructor who participated in the study, was a White female in her late-50's. She was an associate professor and teacher educator in the School of Family Life, and had worked in her present position since 1980. She team-taught the three courses with two faculty members from secondary education, and has taught these courses with one of them for the last decade.

From descriptions of six lessons supplied by the instructor, a 2-hour lesson on classroom management using small group theory was selected based on its ties to constructivist pedagogy, and claims about the instructional strategies that had prompted change within the 32 studies mentioned previously. Before teaching the lesson or instructional episode, the instructor described her instructional goals in an audiotaped interview. Further, she constructed a concept map of the lesson content and explained in writing her reasoning for organizing concepts as she did, specifying relationships among them. To condense the interview data, a summary containing the major ideas was written, and Dr. Adams read the summary to ensure that it accurately depicted her thinking.

On the first day of class, participants constructed an unprompted and prompted concept map of their understanding of the lesson topic. The procedure for having participants construct concept maps was adapted from Eggen, Kauchak, Winitzky, Jensen, and Hadden (1997), Roehler, Duffy, Conley, Herrmann, Johnson, and Michelsen (1990), and Winitzky, Kauchak, and Kelly (1994). Participants first observed a three-part procedure and received prototype maps from other content areas. Candidates then constructed an unprompted map for the topic "classroom management." They brainstormed a list of terms related to the topic to activate prior knowledge, and organized the terms into a concept map depicting the relationships between concepts. After constructing the map, participants each described in

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writing the reason for organizing concepts as they did and specified relationships among them. Candidates turned in these maps.

To construct a prompted map, candidates received an alphabetized list of terms generated from the instructor's map. They constructed another map using as many terms as they liked, and were told that they could integrate additional items not on the list. Again, candidates wrote a description to explain their reasons for organizing concepts as they did and to specify relationships among them.

The instructor taught the lesson on classroom management 2 weeks into the semester. A video camera and field notes were the means used to gather naturalistic data about the instructional environment. Analysis of the video transcript and field notes focused on identifying major instructional patterns, which were then used to construct a narrative description. Dr. Adams read the description to insure its accuracy and increase validity. Further, the amount of time spent on each concept was documented by tallying frequency counts for concepts covered during each 3-minute lesson segment. Inter-rater agreement for this tally was accomplished through individual tallies by two researchers. The few discrepancies in coding the transcript were discussed until they reached full agreement.

At the end of the lesson, candidates constructed an unprompted and prompted concept map as was done on the first day of class. Analysis procedures from Roehler et al. (1990) with one modification suggested by Winitzky et al. (1994) were used for scoring unprompted and prompted maps. Maps were scored for: (a) the number of individual concepts, (b) the number of chunks, e.g., groups of superordinate concepts with two or more subordinate concepts, and (c) a hierarchical structure score, e.g., the sum of the number of horizontal chunks at the widest level and the number of vertical levels (Eggen et al., 1997). Validity and reliability for concepts maps are well established (see Eggen et al., 1997; Michelsen, 1987; Naveh-Benjamin & Lin, 1994; Roehler et al., 1990; Winitzky et al., 1994). Both intra-rater and inter-rater reliability checks were conducted in the present study. Intra-rater reliability was computed at 100%. Further, two researchers individually scored a random sample of maps followed by negotiation. Discussion occurred until there was complete inter-rater agreement.

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After scoring all maps, they were examined both quantitatively for structural complexity and qualitatively for content. Quantitatively, comparisons were made between pre- and post-maps for changes in the number of unprompted concepts, prompted concepts, chunks, and for changes in hierarchical structure. Qualitatively, comparisons were made between pre- and post-maps for: (a) the presence of target concepts (i.e., those from the instructor's map), (b) the use of target concepts under both post unprompted and prompted conditions, (c) the prominence of specific target concepts, and (d) the durability of candidates' non-target concepts from pre- to post-mapping (Eggen et al., 1997).

In addition to constructing post unprompted and prompted maps, candidates identified in writing (a) the most important concept(s) they had learned, (b) the features of instruction that helped them to learn each concept, and (c) why these aspects of instruction helped them to learn the concept(s). Findings reported here are related to candidates' responses to the first query. Codes for these data included the 28 target concepts from the instructor's map. To ensure reliability, two researchers independently coded the data followed by discussion until reaching full agreement concerning the few instances in which the same code(s) had not been applied. Finally, candidates compared their unprompted pre- and post-maps and wrote a paragraph indicating how their knowledge changed as a result of the instruction. While these postdata were being collected from candidates, the instructor also identified the concepts on her map that she felt were most and least emphasized during the instruction.

On two days following the instructional episode, four candidates selected at random participated in two stimulated recall sessions, one on each day. Each stimulated recall session was audiotaped. Either a researcher or a research assistant viewed a videotape of the instruction with each participant using a videocassette recorder (VCR) and a television monitor. Rather than show candidates video episodes that researchers or the instructor recognized as critical incidents, each student was instructed to stop the videotape in places where the instruction best aided her learning. At these points, each candidate identified the instructional strategy that helped her to learn, why it was helpful, and what she learned. Reported here are findings related to the latter query. The 28 target concepts from the instructor's map

were used as codes, in addition to one termed "incidental learning." After coding candidates' responses twice to ensure reliability, the instructor independently coded the data. Discussion occurred until reaching full agreement concerning all instances in which the same code(s) had not been applied. Also as part of the stimulated recall interviews, candidates answered questions to assess their beliefs about teaching and learning generally. They include: (a) Imagine you are teaching in your ideal setting. Describe a typical class period. (b) How do people learn? and (c) What are the most important things that teachers do to help students learn?

Finally, candidates completed a short answer assessment 6 weeks after the instructional episode. Rating scales developed using guidelines specified by Stiggins (1997) for scoring open response formats were used to analyze candidates' responses. After scoring candidates' responses on two separate occasions, the instructor independently scored candidates' responses. To resolve the few discrepancies in scoring, discussion ensued until full agreement was reached.

Findings

The instructor's goals. Analysis of the interview with the instructor and her concept map of the lesson topic revealed that the instructor's goals focused on teaching candidates to use small groups as a means of organizing students to manage various aspects of classroom life. These include: (a) elements in the near environment, (b) group processes among students, and (c) the assessment of practices within the classroom. She also saw using small groups as a means to: (a) increase the focus on teaching and learning by reducing the amount of teacher time spent on management, (b) shift more control from the teacher to students, and (c) heighten student motivation. Ultimately, she wanted to teach candidates to create a learning environment where democratic leadership prevails.

The instruction. Analysis of the lesson transcript and field notes revealed that approximately 25 different strategies, categorized according to six clusters, were used during the 2-hour lesson. Summarized here are those strategies that had either relatively high frequency counts or were used for a long duration.

Experiential learning was a prominent aspect of the instruction, in that it constituted approximately one-third of lesson time. Candidates experienced two small group teaching methods, and they experienced a way to report back to the whole class following one of the methods. Discussion was also a prominent part of instruction. The instructor asked many questions. Students gave responses or examples of concepts. In many instances, the instructor paraphrased students' responses. She also elaborated on students' comments and/or examples. Further, two prominent strategies associated with teaching concepts were used during the lesson. The instructor gave many examples, and spent about one-fifth of the lesson time using one of two cases. Finally, a prominent strategy was the instructor's explanations of concepts and relationships among them, using visual stimuli to illustrate concepts on the chalk board.

Candidates' beliefs. Analysis of candidates' responses to three questions revealed that their beliefs ranged along a continuum from traditional, teacher-centered views of teaching and learning to views associated with various constructivist learning theories. We describe here the beliefs of Nan, Amy, Cathy, and Patty. Similarities and differences across these data are then noted.

In responding to the question about what a typical class period in her ideal setting would look like, Nan mentioned some elements of direct instruction. Her response suggests that she is in the beginning stages of learning to teach because her concern is with order rather than learning (Fuller, 1969). In terms of what both she and the students do, everything would flow in an orderly manner. Nan stated:

> Students would come in on time, be in their seats when the bell rings, with all their books and equipment that they are supposed to bring . . . . I'd have my lesson plans all ready and the equipment and everything that we needed all ready to go ahead of time. I would give my little instruction or demonstration. Then I would let the students go to work, working on their little projects or whatever. They could talk amongst themselves as long as they stayed on task. Ten minutes before the bell rings they would clean up, put everything away where it belongs. Hand in any assignments or projects that were due. Then the bell rings and they can go.

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In response to the questions about how people learn, Nan's comments suggest that she does not understand learning theories. She stated, "I think everybody learns differently. It's different for every person." Her response then shifted to focus on an idea central to information processing, one she said that she learned in class. That is, "everybody learns through their five senses." Her final comments coincide with constructivist theories in a broad sense. Nan remarked, "I think most people learn best if they can do it hands-on, if they can get involved. If they can see it for themselves, handle it for themselves. I think people learn and retain more that way."

Nan's response to the final question about what teachers do to help students learn provides evidence that she has constructivist aspirations but only knows how to act in ways consistent with transmission views of learning. That is, she wants to be student-centered but does not have more than a surface understanding of the corresponding actions. She begins by talking about creating a safe learning environment. Nan stated:

> I think the first thing is that they do build relationships of trust. They build an atmosphere in the classroom where everybody feels that they belong. And everybody feels like no matter what they say, they'll be respected for their opinion or their point of view. Or, they won't be made fun of because they don't understand or because they have a lot of questions. I think that is probably the most important thing.

Then Nan focuses once again on order and repeats her previous response about "having hands-on activities where students can get involved . . ."

Amy's description of a typical class period begins with ideas that correspond with transmission views of learning. She stated, "Students would be listening attentively. There would be some lecture . . . " Her response then shifted to include opportunities for elaboration associated with information processing. That is, she mentions discussion and a learning activity where students talk to each other or with the teacher. Notice that her response involved multiple modes of representation. Amy concluded by saying that the activity "would get them involved in learning actively," a notion that in a broad sense is

consistent with constructivist learning theories.

Amy's beliefs about how people learn also appear to be consistent with a range of learning theories. She responded that people learn "through experience. Through practice. Through doing it themselves. Through internalizing it."

Finally, Amy's response to the third question suggests a teacher-centered view of how teachers help student to learn. Her response focuses on modeling interest and excitement. She believes that she can motivate students to learn with her behavior rather than focusing on designing instruction so that she can make sense of students' cognitive processes. Amy states, "I thought about how I could do that and I realized that maybe being that way myself will help them be that way, as an example and being excited about what I've learned, and what I am learning continually."

Cathy's description of a typical class period in her ideal setting begins with a demonstration, a form of modeling, either by her or by a student. Interestingly, Cathy's focus on having a student do the demonstration is centered on using students' prior knowledge. She stated:

> I think that students bring especially in this area, bring in a lot of talents that I don't think are used as much. I look at Mindy and she's been in 4-H for a million years. She has a lot of skills to bring into a classroom that I've learned over a longer period of time."

Cathy's description then focuses on students having enough time for learning while working on a project during a lab. In her ideal setting, the class periods would be long ones. Thinking about having enough time for learning seems atypical for a beginner.

Finally, Cathy notes that the lesson would not include lecture. Instead, she said there would be "a lot of personal interaction between myself and the students, helping them to understand principles that are later demonstrated or were previously taught or learned." Cathy's mention of her interaction with students suggests that she is concerned with the motivational or social aspects of the class. Further, she alludes to using rehearsal or repetition to help students understand principles.

In terms of how people learn, Cathy mentions that they learn visually and by being actively

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involved, notions consistent with information processing and constructivist learning theories generally. The most prominent ideas in Cathy's response, nevertheless, concern the social or interpersonal dimensions as being integral to the learning process. She remarked:

> And I think they learn best when they know that someone cares about them. I think that the classes that people hate the most are usually the ones where the teachers, they could care less if the kids were there or not. They're just there for the pay check. And I think it's really sad that a lot of kids come out of high school hating certain subjects because they had a teacher who didn't care about them or anything else.

Two ideas surface in Cathy's response about what teachers do to help students learn. First, her focus is student-centered. Self-regulation and interaction with peers are notions suggested by her comment:

> I think within the confines of the classroom allowing the student to explore things a little bit on their own. To interact with others so that they know that they are not the only one that feels certain ways. I see that with the small groups, that's a good way for students to say 'Hey, I'm not alone.'

Cathy's response then shifted to a focus on order, only her focus here is not an end in and of itself. She is focused on student learning.

> I think that teachers can be organized, be prepared, because if they're not they are going to be too frantic about what is going to happen that day. And they are not going to be able to concentrate on the students. If you have it in your mind you can teach it and you can pay attention to what the students are learning and help them to be their best.

A theme emerged across Cathy's responses to all three questions. That is, she believes that interaction and rapport are important aspects of teaching and learning.

Patty's description of a typical class period provided evidence that she understood what is required to learn in terms of using prior knowledge and accessing different forms of memory. Her

response is consistent with both cognitive and social constructivist learning theories. She stated:

> As a teacher I would be using different methods of teaching for many different, the different senses. I appreciate visuals and other unique ways of incorporating music or other . . . things they can relate to in their society. I would also ask a lot of questions. I think questions are a great way for them to remember things. And also to come up with answers that they already, I think people know a lot of things they don't realize they know and so, that would help trigger learning in their heads. I would probably do things like group work where they would split off. I don't like being the only talker, speaker in the classroom. I think that they should do some teaching themselves and teach each other.

Patty's response to the question about how people learn focused on four ideas that coincide with various learning theories. The first part of her response is consistent with constructivist theories in a broad sense. She stated, "I think experience is important. Living it out or acting it out." Patty then mentioned repetition, an idea that corresponds with information processing. She said, "I found in my life repetition works." The use of prior knowledge, a notion underlying schema theory, also surfaced when she declared:

> Being able to relate to it, the information to your own life. Or being able to say, yea I remember. Using support from your history or your memory bank to reinforce things you already, new things you are learning. So you need to have something to look back at, to reinforce it.

The importance of practice, central to theories of skill learning, was evident when Patty remarked, "Practicing what you learn really helps. When I get up and I teach a concept, or when I . . . [make decisions] according to what I've already learned and I apply that, I remember it . . ."

To Patty, the most important things that teachers do to help students learn include: (a) making the content relevant for students' lives, (b) being clear and keeping students' attention, and (c) using assessment to increase learning. Patty noted that to make the content relevant for students' lives teachers "demonstrate how the information will help them, give them what they desire in life." Further, she

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maintained that "if you don't keep their attention then nothing, no learning will occur." Both of these ideas coincide with information processing theories. The last part of Patty's response suggests that she is trying to move from a behaviorist to a constructivist view of assessment. She mentioned that learning is a process "and that they [students] can succeed, even though it may take some longer and some shorter." Patty's response further suggests that she sees assessment as feedback rather than using grades punitively to motivate students.

In sum, candidates' beliefs can be placed along a continuum. Of the four students, Patty and Cathy's responses were the most consistent with constructivist learning theories. Patty's responses were clearly the most cognitively oriented. Her responses contained many examples of ways that a teacher can use information processing, schema theory, and theories of skill learning. Cathy's responses, in contrast, contained fewer such examples. Nevertheless, she repeatedly mentioned the importance of interaction and rapport in the learning process. Amy's responses suggested that she has some beliefs consistent with constructivist theories and others that coincide with behaviorism. Finally, Nan's responses suggest that she has constructivist aspirations. Unfortunately, the specific actions she mentioned coincide with transmission views of learning.

Relationships between candidates' beliefs and learning. We would expect that candidates whose beliefs correspond more closely with the knowledge base in education would learn the most during their teacher education course work. The reason for this was noted by Ausubel. He stated: "The most important single factor influencing learning is what the learner already knows" (Ausubel, 1968, p. vi). Ausubel was referring to assimilation, a much simpler process than is accommodation where the entire makeup of an individual's cognitive structure is changed.

To determine how candidates' beliefs influenced their learning, five rank-ordered lists of candidates' scores and frequency counts were used, i.e., postunprompted concept maps, postprompted concept maps, questions accompanying the postmapping, stimulated recall interviews, short answer assessment. Each candidate's rankings from the lists were added together and divided by 5. Note that the

lower the number, the higher the ranking. These calculations suggest that Patty (2.5) learned the most followed by Amy (3.8). Cathy (7.0) appears to have learned substantially less, with Nan (10.7) having learned the least. Candidates' beliefs, therefore, were good predictors of those candidates who learned the most and the least. Recall that Patty's responses to the belief questions contained many examples of ways that a teacher can use information processing, schema theory, and theories of skill learning. Nan, in contrast, appeared to have constructivist aspirations, but only identified actions that coincide with transmission views of learning.

Compared with Cathy's responses to the belief questions, Amy's responses did not seem as consistent with constructivist views of learning and teaching. Amy appeared to have some beliefs consistent with constructivist theories and others that coincided with behaviorism. Nevertheless, Amy learned substantially more during the lesson than did Cathy, whose beliefs focused primarily on the importance of interaction and rapport in the learning process.

Discussion

Researchers often assume that a strong connection exists between the deeply held beliefs candidates bring to teacher education and subsequent learning. A problem has been that researchers seldom provide sufficient empirical evidence to support this connection. This study documents that differential learning outcomes among four candidates, specifically those candidates who learned the most and the least, were indeed connected to their beliefs about teaching and learning.

The review of the literature that lead to the present study contains various themes concerning preservice teacher learning. One of these themes focuses on how candidates' beliefs impede their learning. Recall from the review that, of the nine studies suggesting limited or no change in candidates' conceptions, six accounted for their findings by citing candidates' inflexible prior knowledge and beliefs. Note that few of these nine studies examined the instruction used with candidates.

A much less apparent theme across the teacher education literature centers on the approaches that prompt change. Included in the literature review were 32 studies that reported change in candidates'

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conceptions and practices. The findings from these studies are fragmented because many differing strategies were employed, and most studies did not provide sufficient evidence linking candidates' learning with various instructional strategies. Importantly, none of them examined candidates' beliefs.

Faulty assumptions could be drawn from looking at these two groups of studies in isolation from one another (Jensen, 2001). One erroneous assumption would be that candidates' beliefs alone impeded their learning. To make this claim would be faulty because there was little or no evidence that candidates' beliefs and the instruction they received were examined together. Having examined studies reporting change, an equally faulty assumption would be that candidates learned because their beliefs were consistent with course content. Future research needs to cast a larger net to account for both the beliefs that candidates bring, and how various instructional approaches influence these beliefs. Given the vast array of instructional approaches advocated across the teacher education literature, many such investigations are needed to provide direction for practice.

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